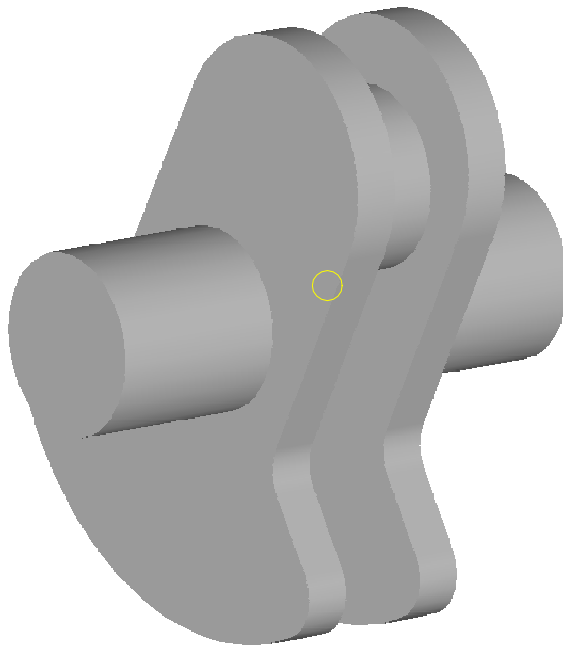


Crankshaft

an I-DEAS Exercise in Solid Modeling

by

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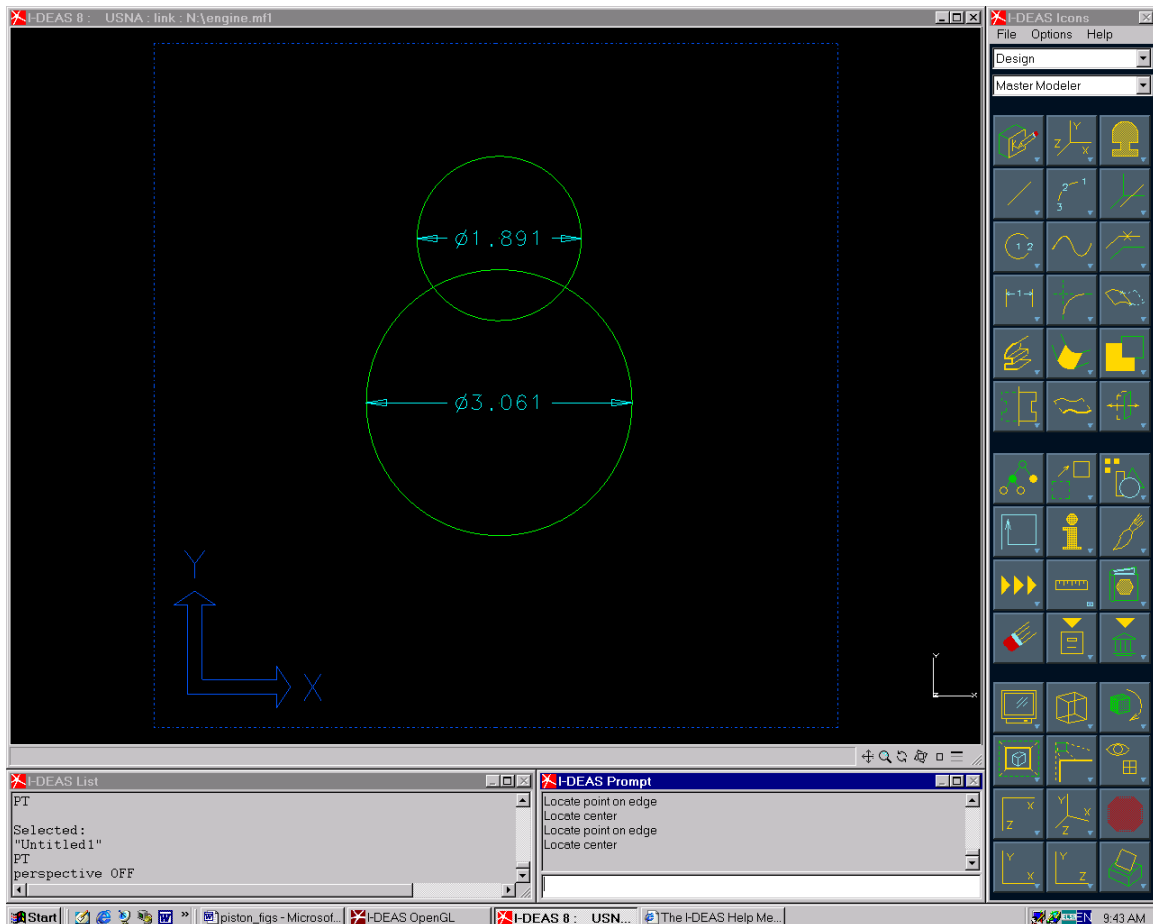
Build a Crankshaft

In this exercise you will build a model of a crankshaft for an engine. Here are some tips to remember when going through the exercise:

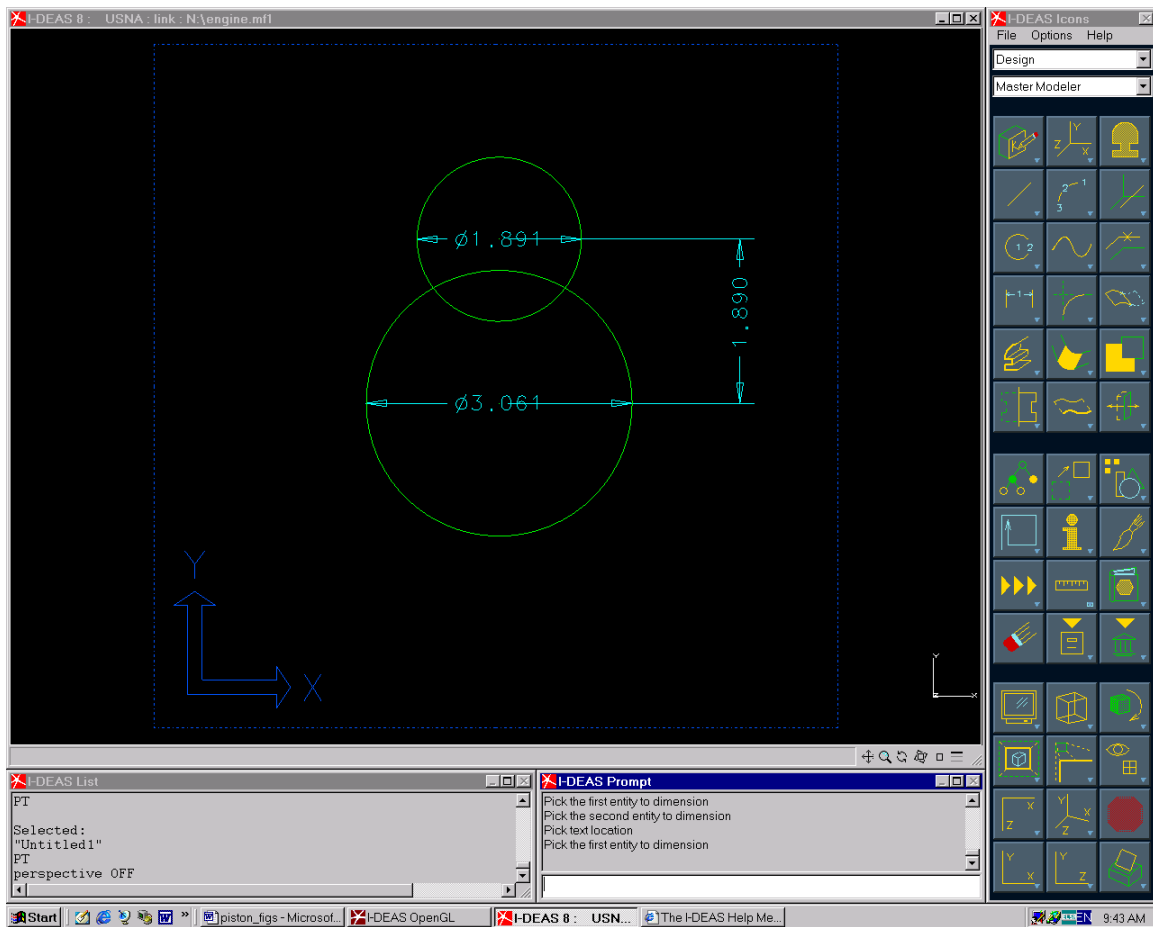
- Pay attention to the I-DEAS List and Prompt regions at the bottom of the large display window. The prompt region asks you for feedback or to select entities, the List region provides information.
- You can elect the default response from the prompt region by clicking the center mouse button. The button assignments are:
 - Left button - pick or select
 - Center button - Done or OK or accept default
 - Right button - display list of options for current command
- **Save your work after the completion of every successful step.** If you make a mistake on the next operation, you can recover to the model state from the last Save by typing *Ctrl-z*. There is no general Undo feature in I-DEAS!
- Use the Dynamic Viewing buttons (F1-Pan, F2-Zoom, and F3-3D Rotate) to adjust the display while you are in the middle of a command to help you select the entity you want. Hold the appropriate button down and drag the mouse in the display region.

Build a Crankshaft

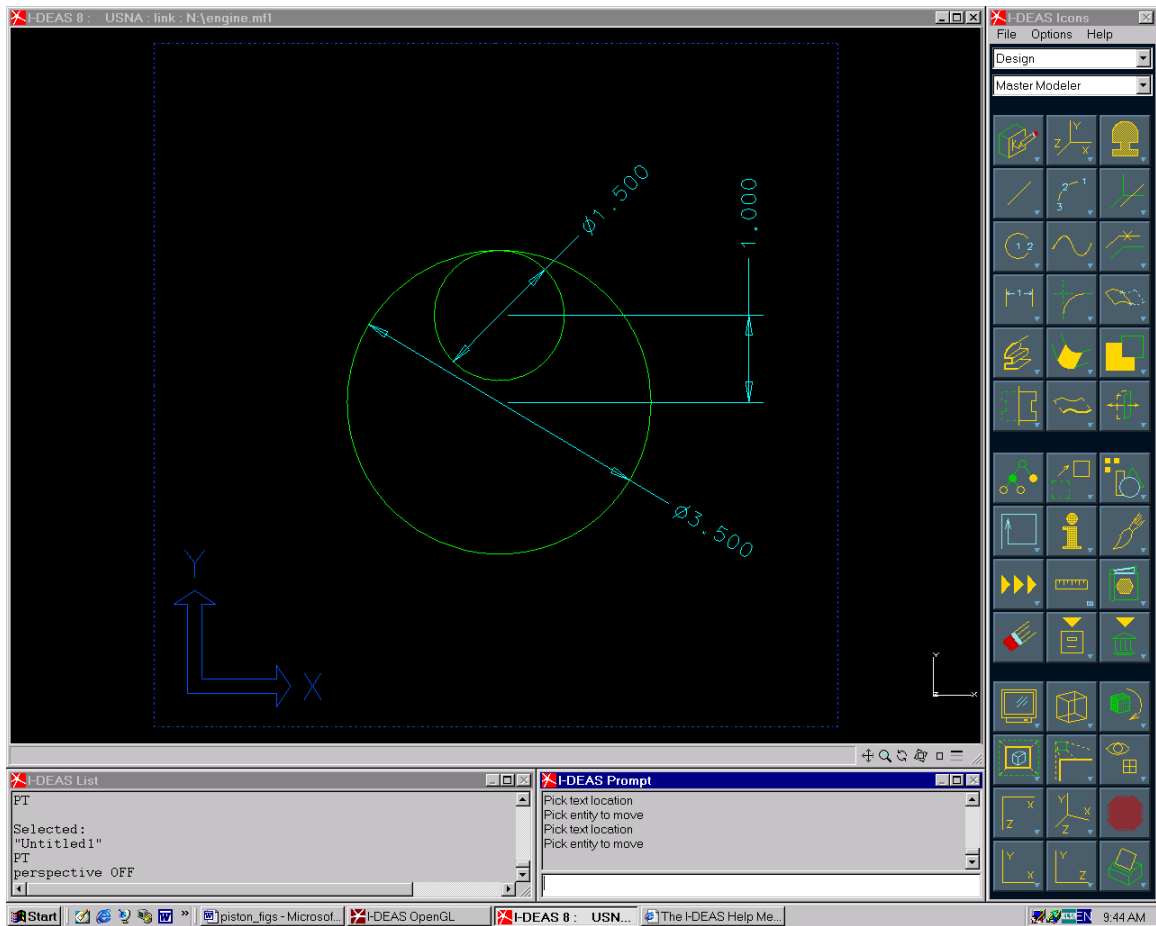
1. Sketch two circles, about 3.5 in. and 1.5 in. dia., with their centers oriented vertically as shown below.



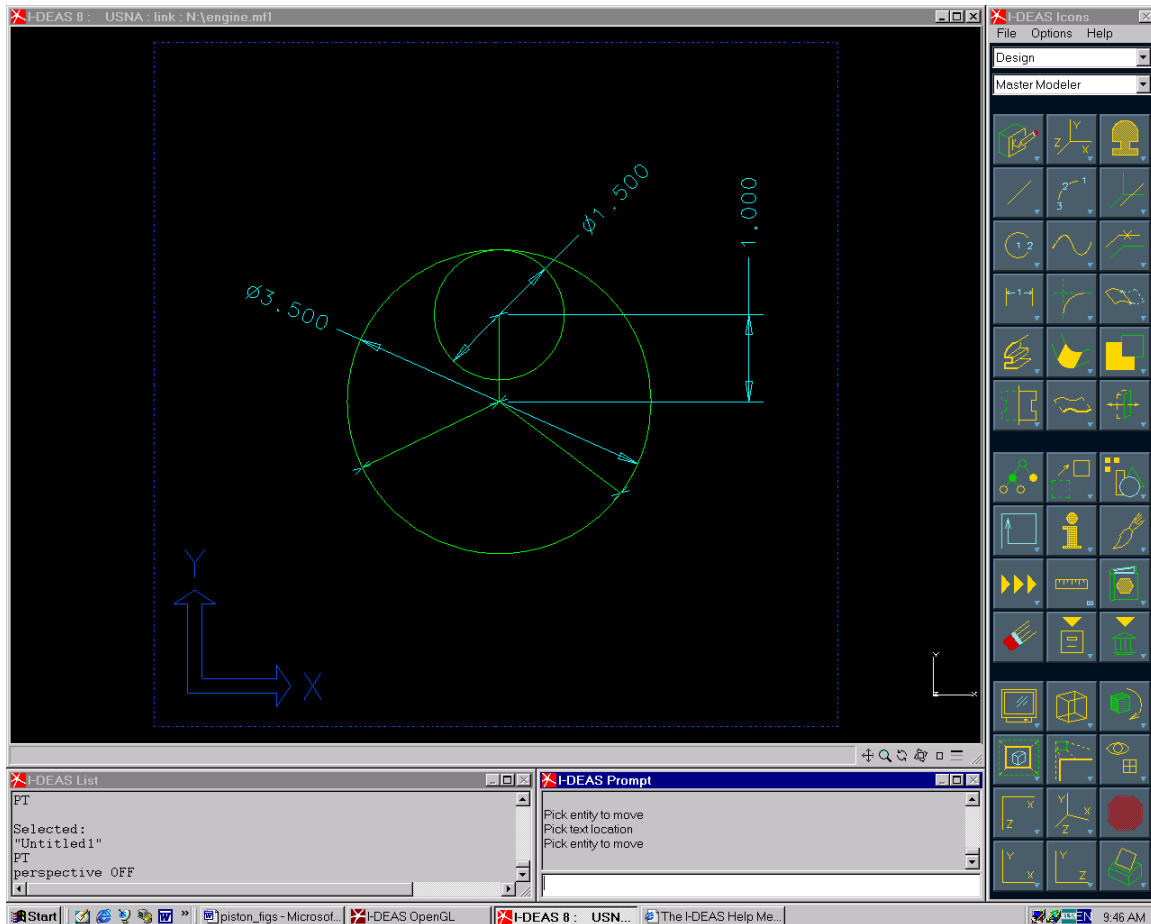
2. Add a dimension for the vertical separation of the circle centers.



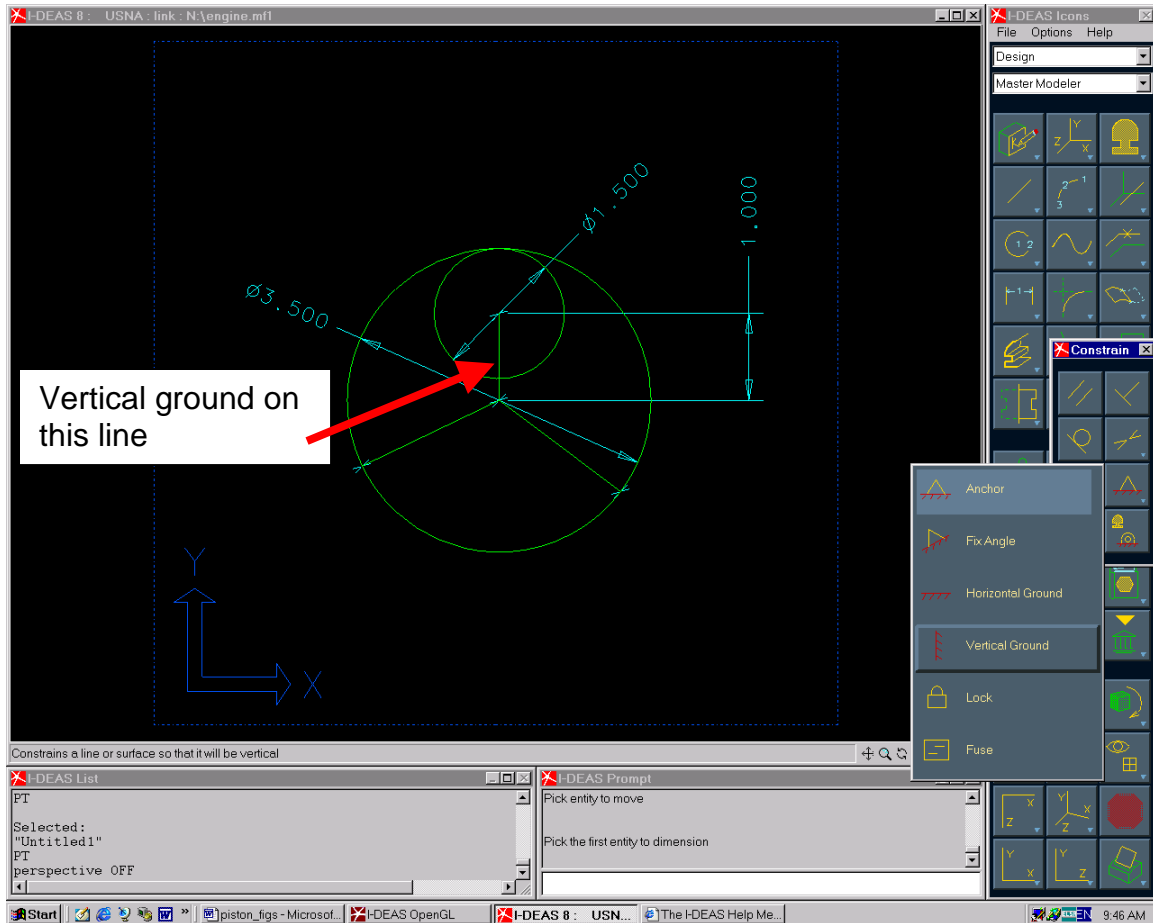
3. Modify the dimensions as shown.



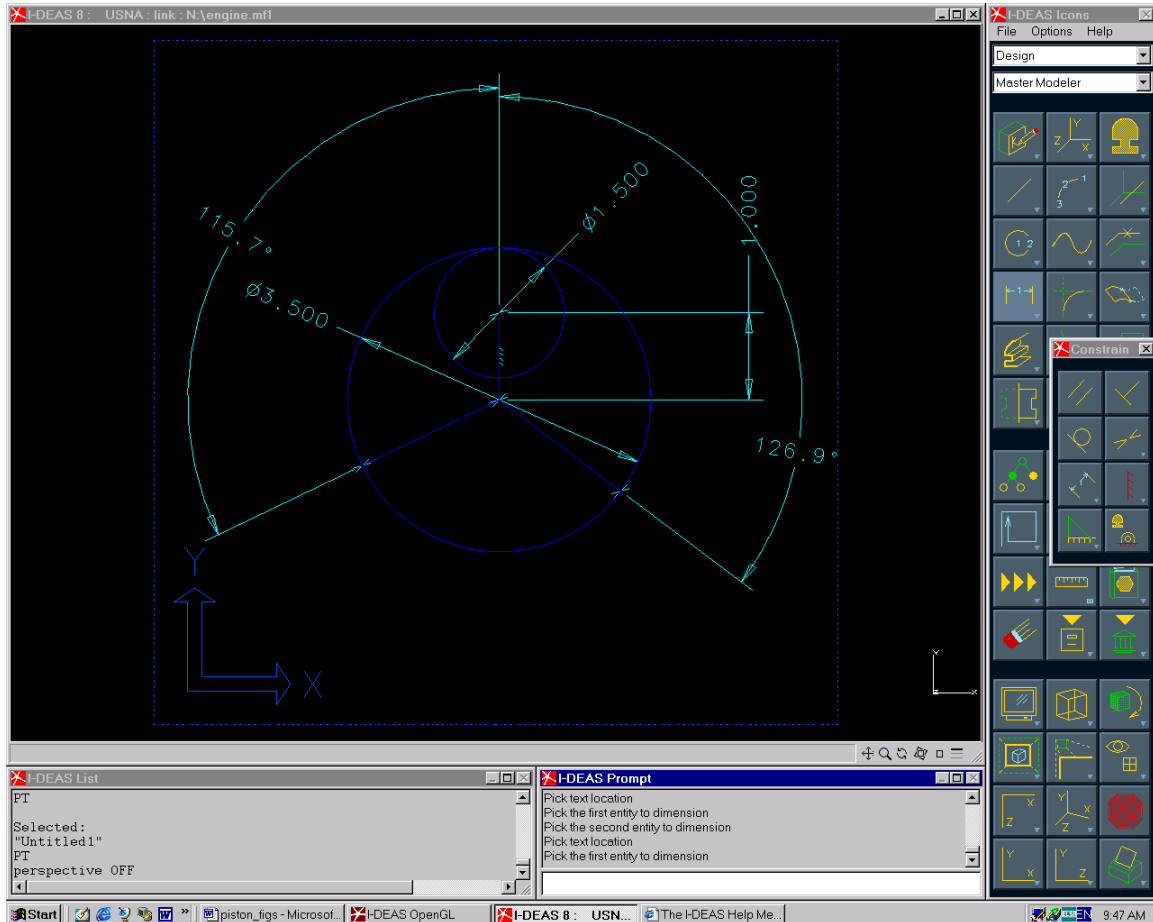
4. Sketch a vertical line between the two circle centers, and then sketch radial lines from the center of the large circle to the circle, oriented about 120° apart.



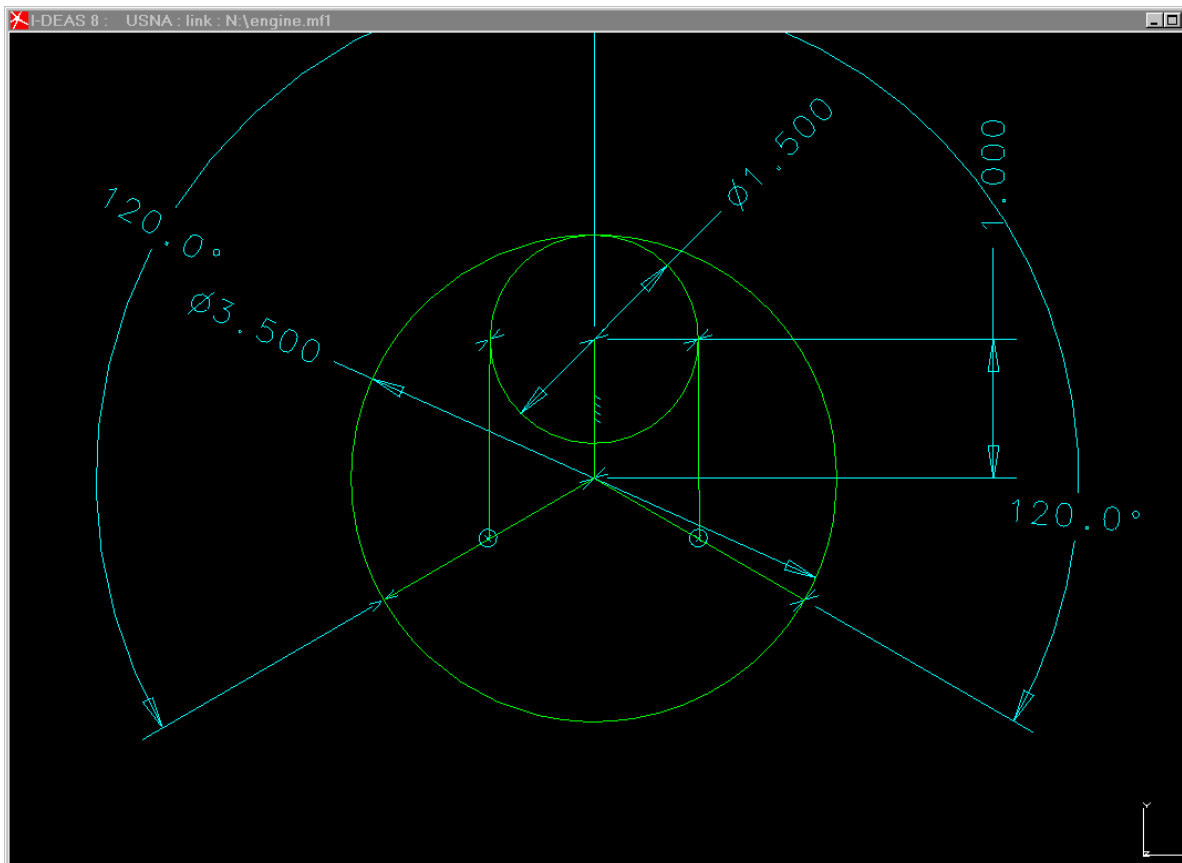
5. If the constraint wasn't created automatically when you sketched the vertical line, manually create a **Vertical Ground** on the line connecting the circle centers.



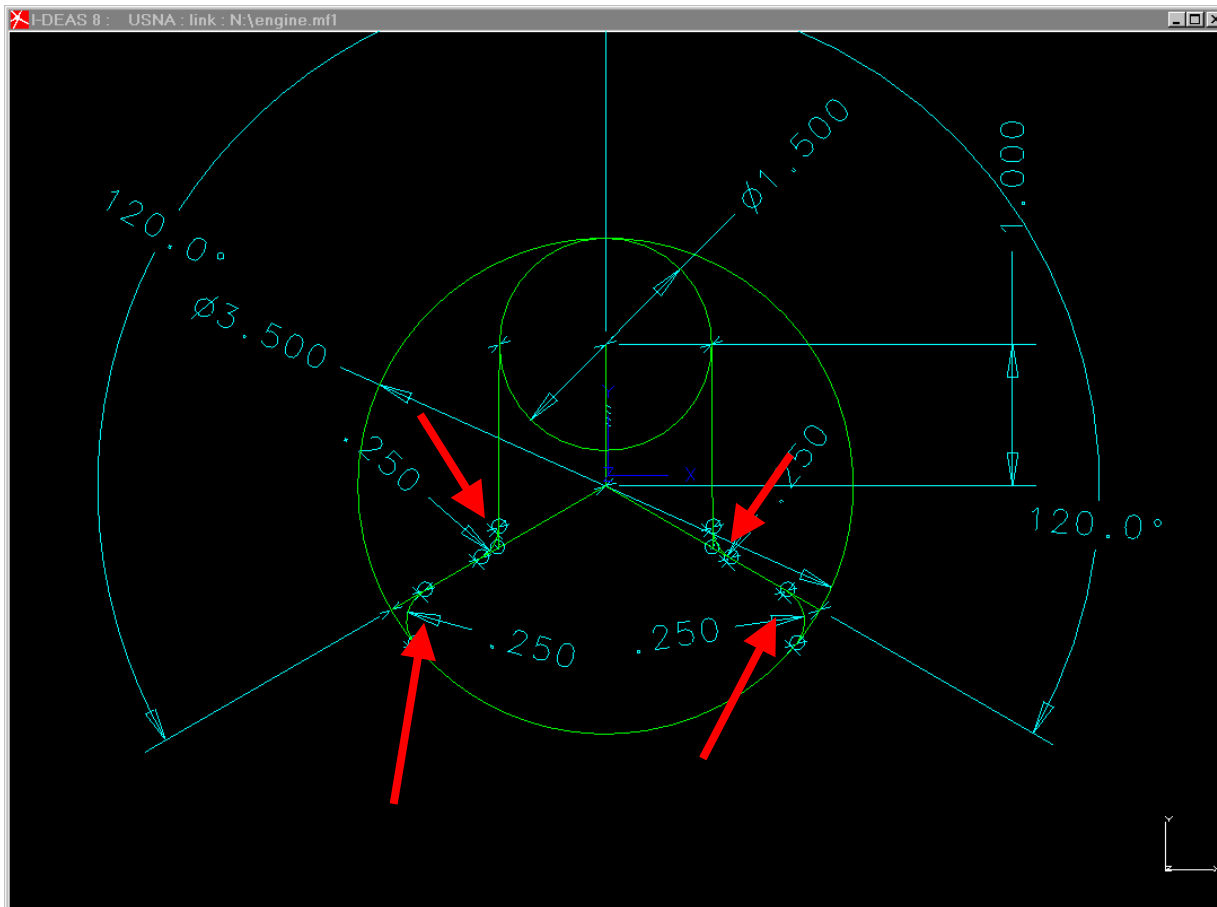
6. Dimension the angle between the other two radial lines and the vertical ground as shown. Modify the dimensions to be exactly 120° after you create the dimension.



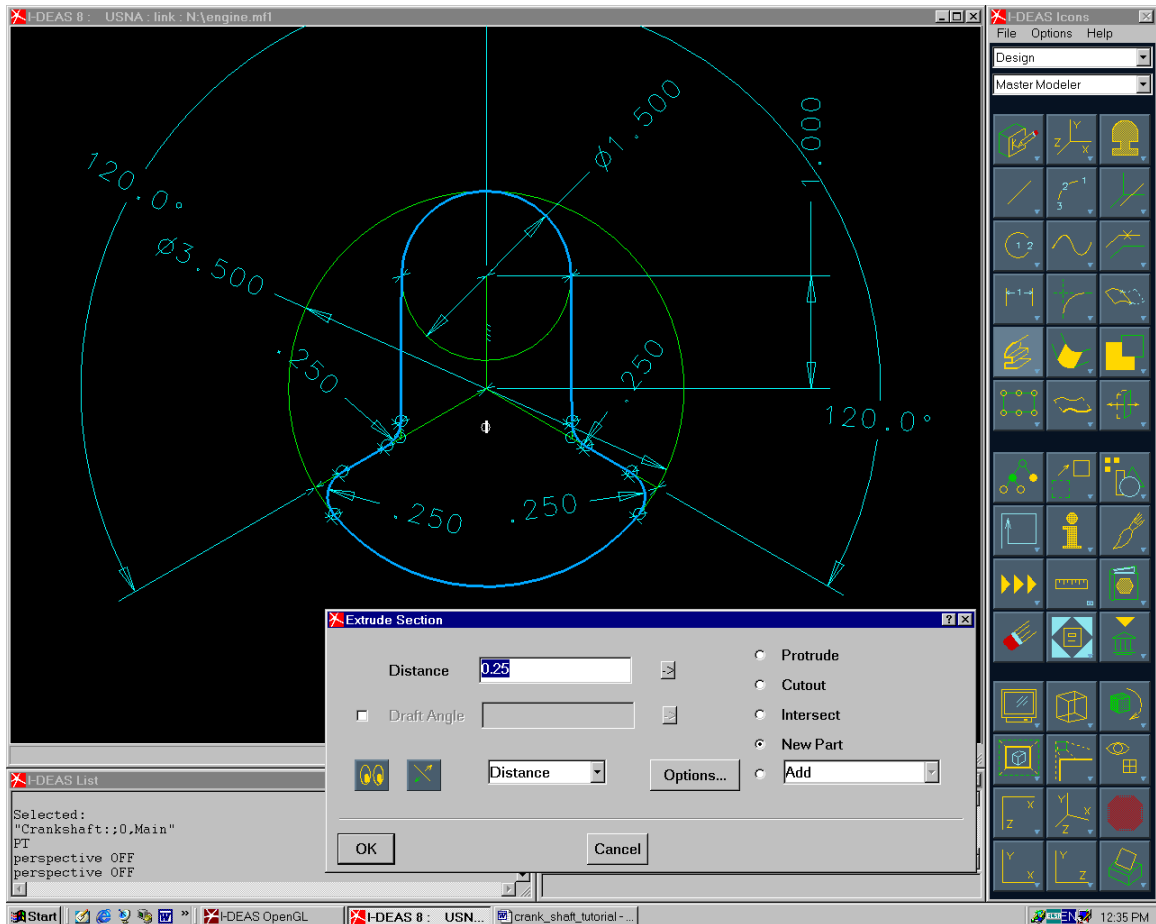
7. Draw two vertical lines from the edge of the smaller circle to the lower radial lines as shown. After picking the start point for a line to be at the max. width point on the circle, use **RMB**, then **Options...** and check **Vertical** to force the line to be vertical.



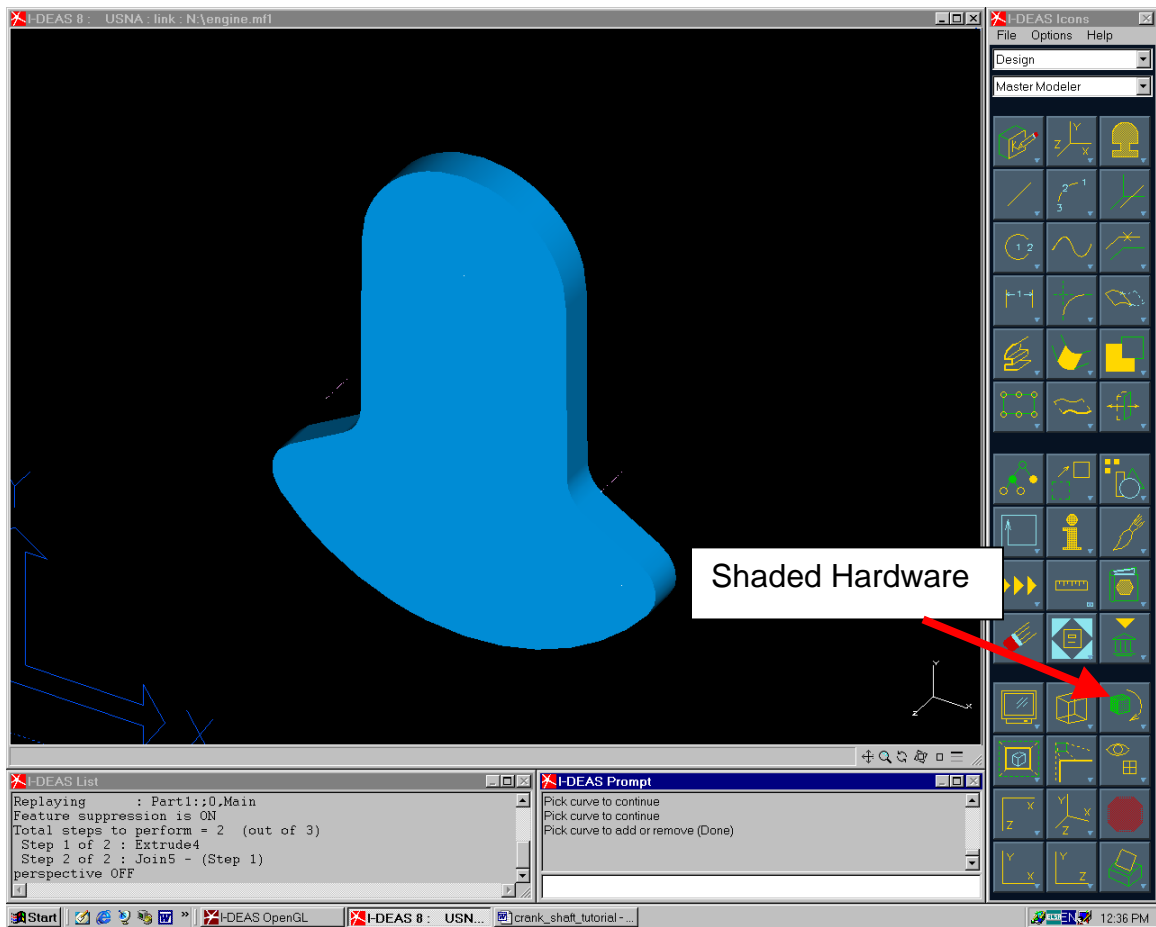
8. Add 0.25 in. radius fillets to the intersections where indicated. *Make sure you uncheck the option to **Trim/Constrain** when creating the fillets!*



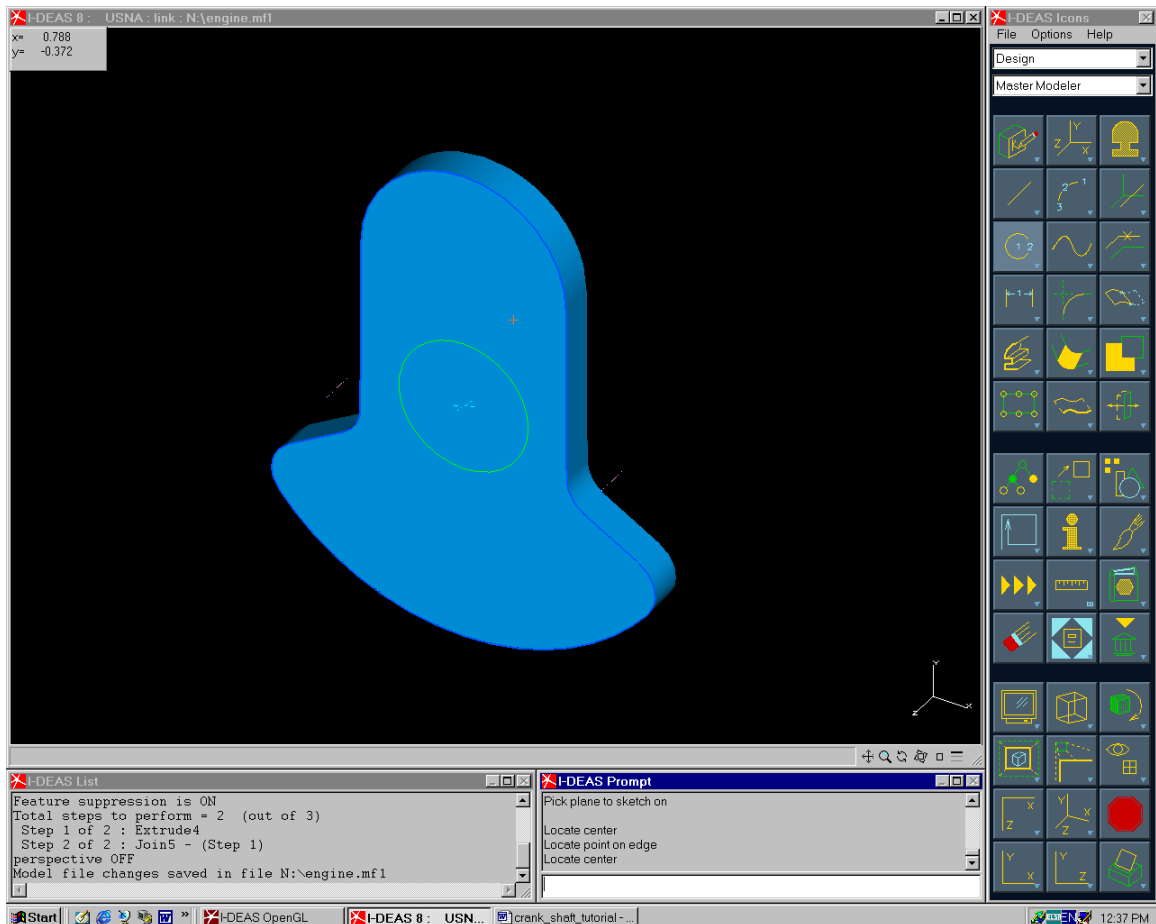
9. Use the **Extrude** command icon and select the section shown. Use **RMB** and select **Section Options** and make sure **Stop at Intersections** is checked. Extrude a new part a distance of 0.25 in.



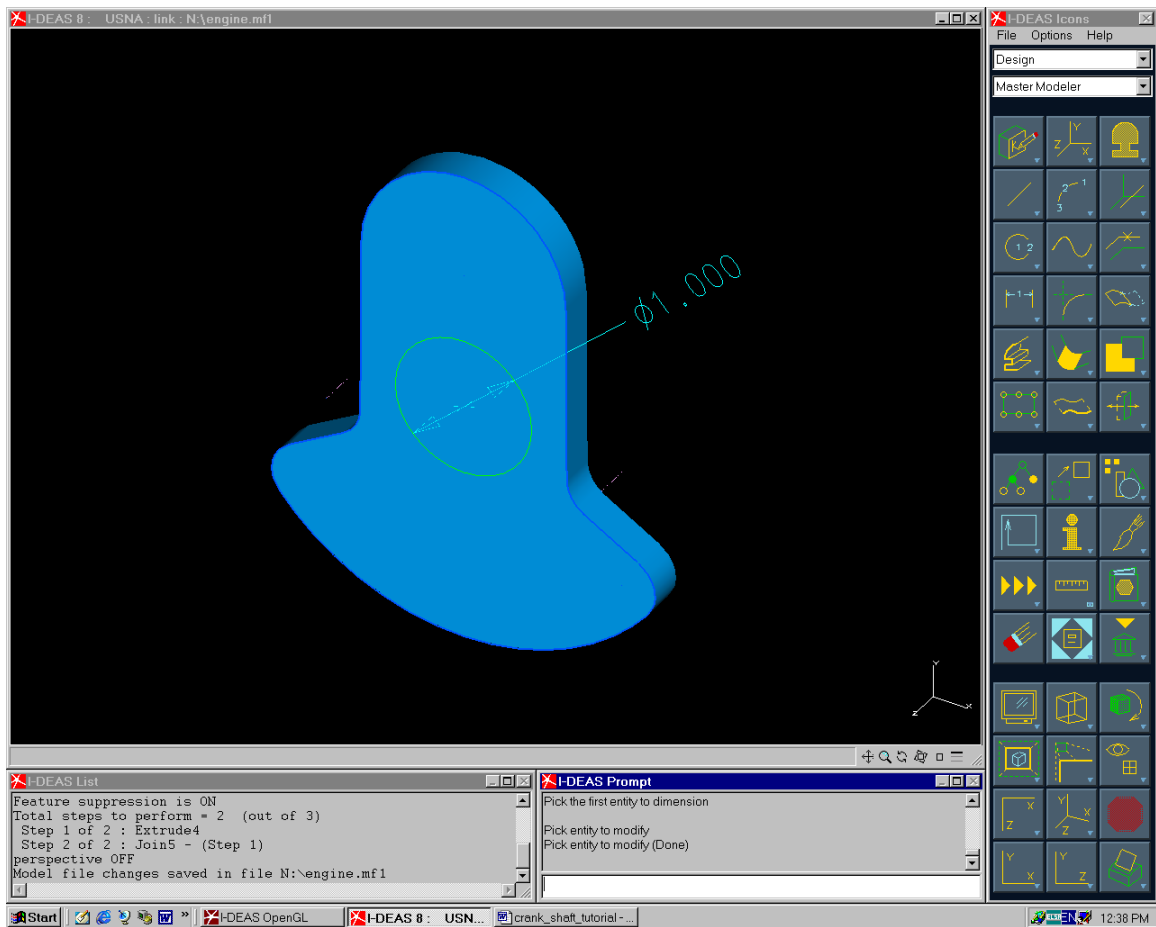
10. Display using **Shaded Hardware** to see the solid model.



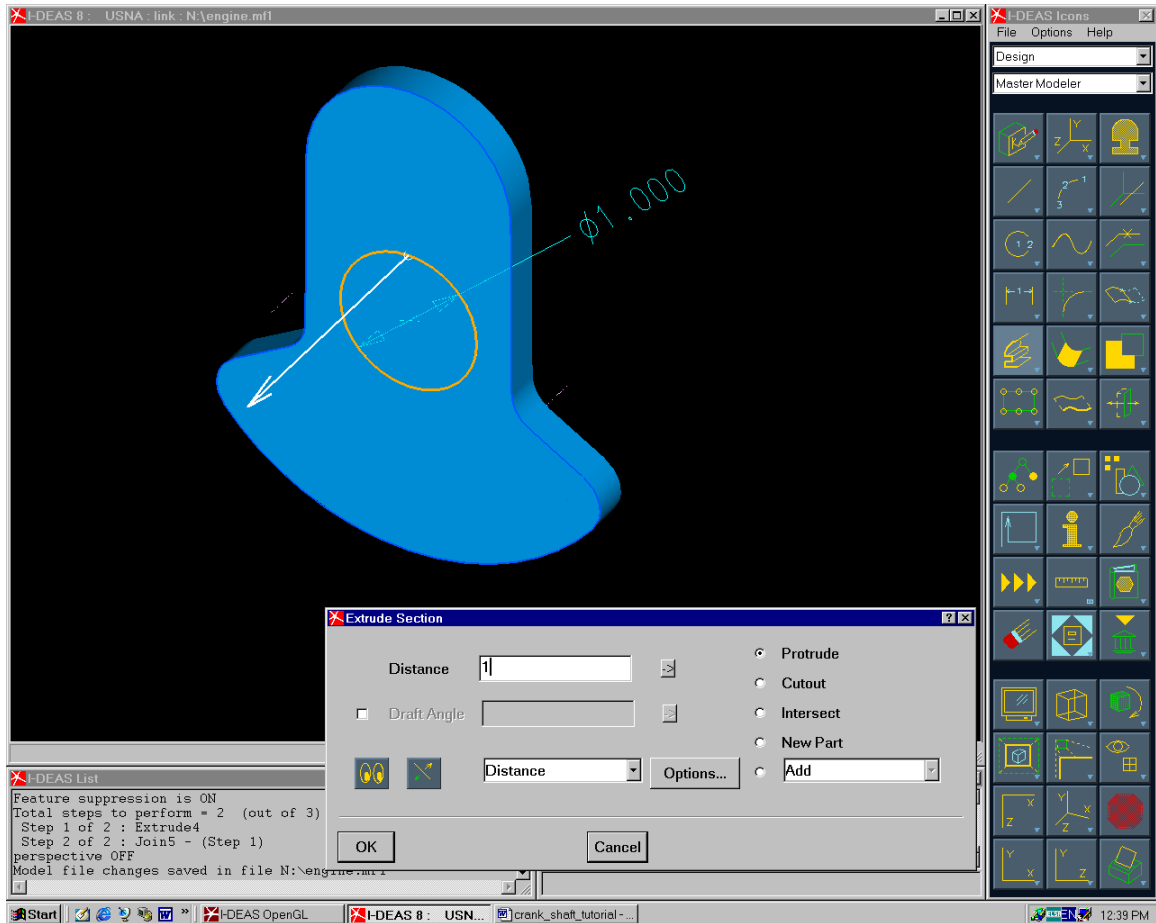
10. **Sketch in Place** and select the front face of the offset plate. Draw a circle on this face, picking the center of the circle to be at the center of the large arc-shaped segment of the solid. If you have trouble having this point recognized, switch to **Line View** mode and try again.



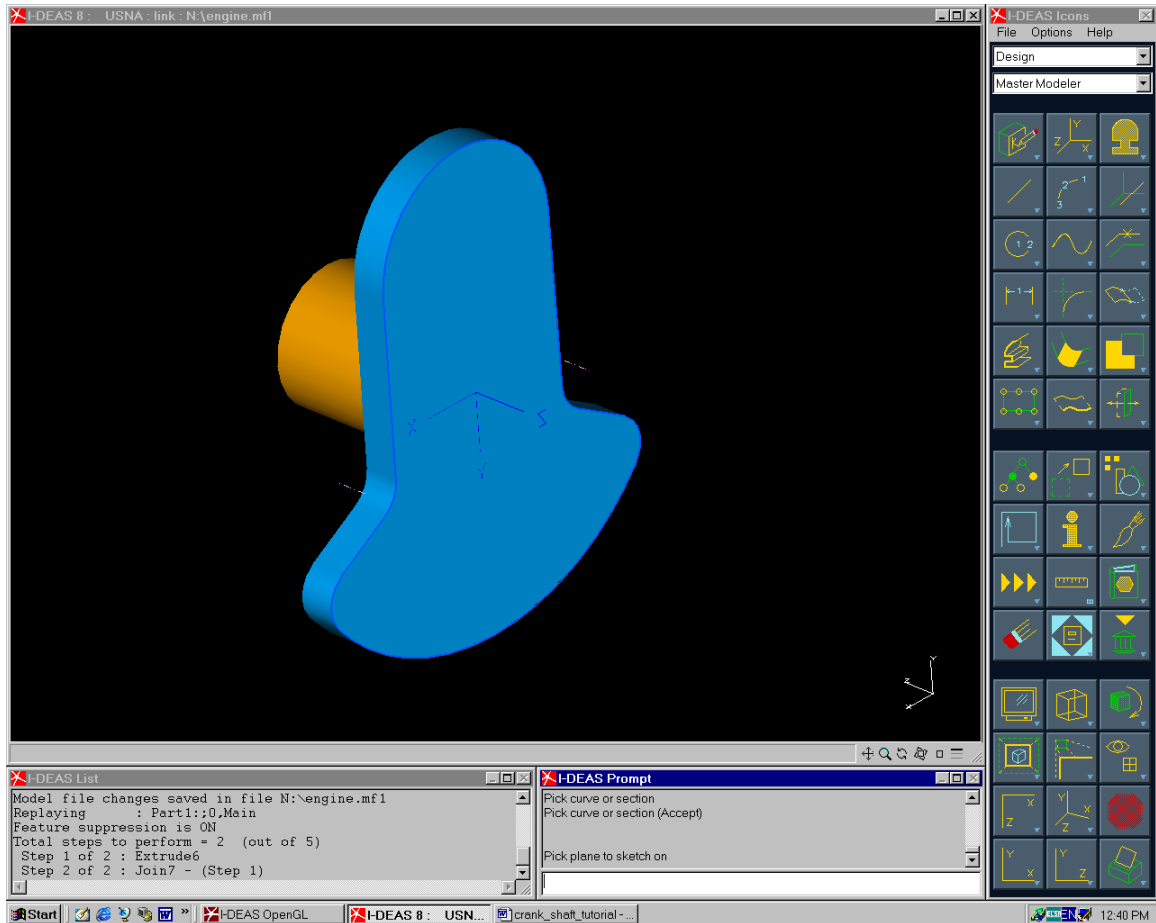
11. Add a dimension to the circle if one didn't appear and modify the dimension to indicate a diameter of 1.0 in.



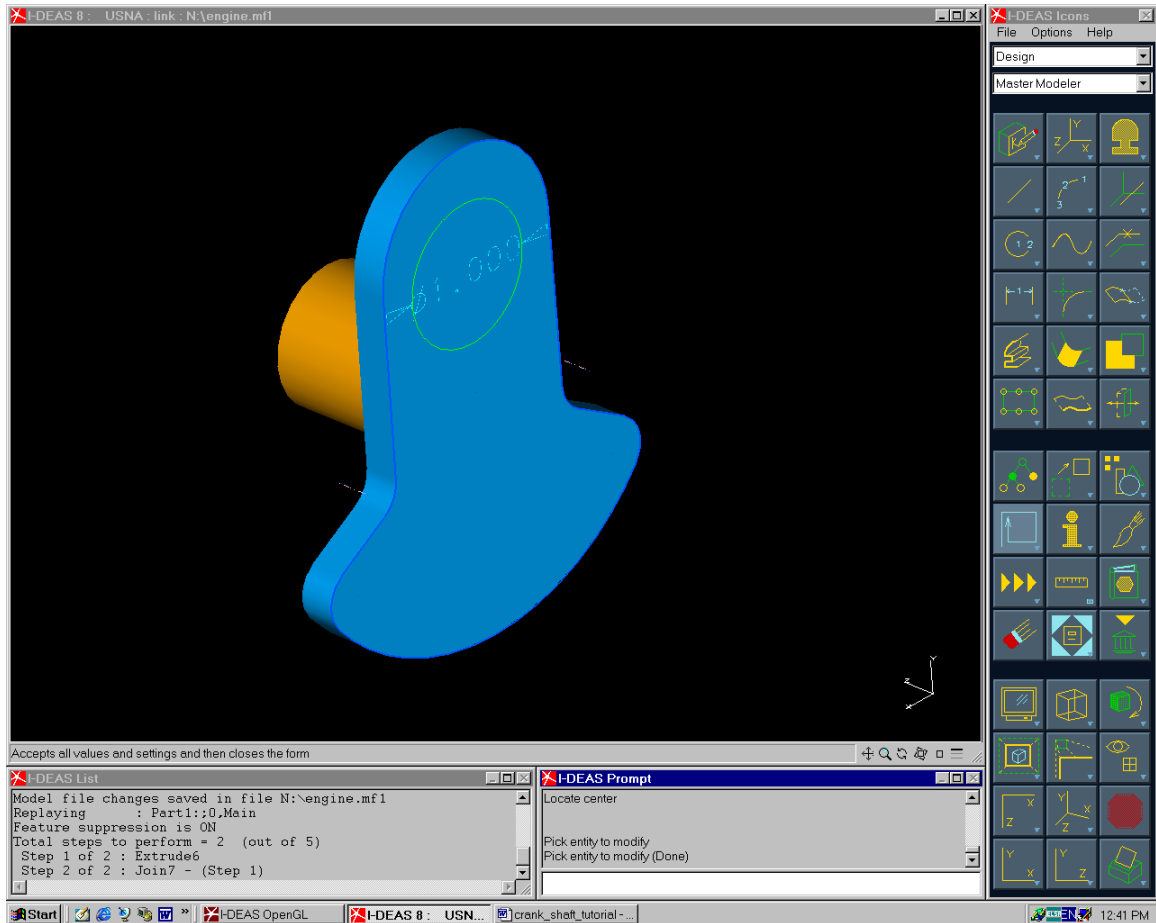
12. Pick the **Extrude** icon and select the circle you just created. Set the extrude distance to 1 inch and make sure the **Protrude** option is selected.



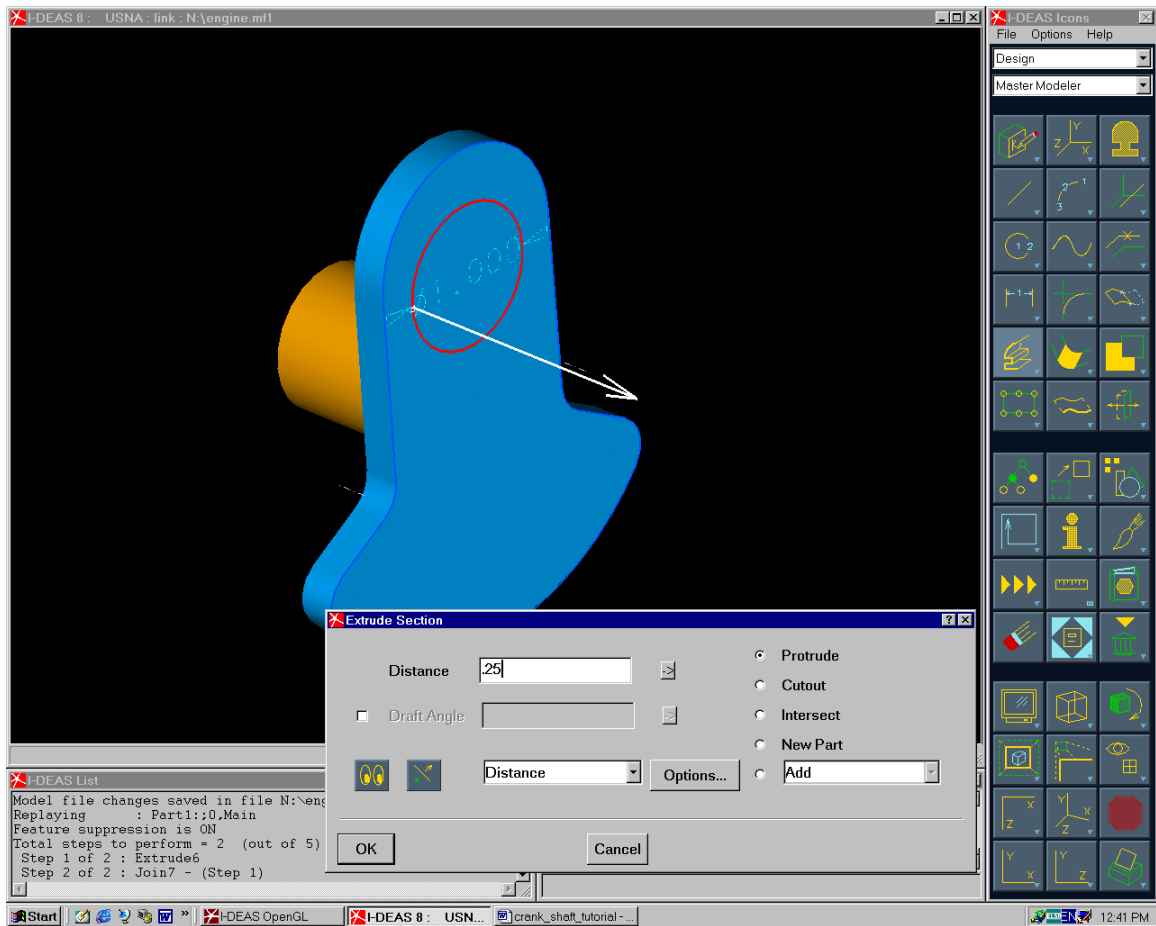
13. Use the F3 button to rotate the display so you can see the backside of the offset plate. **Sketch in Place** on the face opposite the one you just worked on.



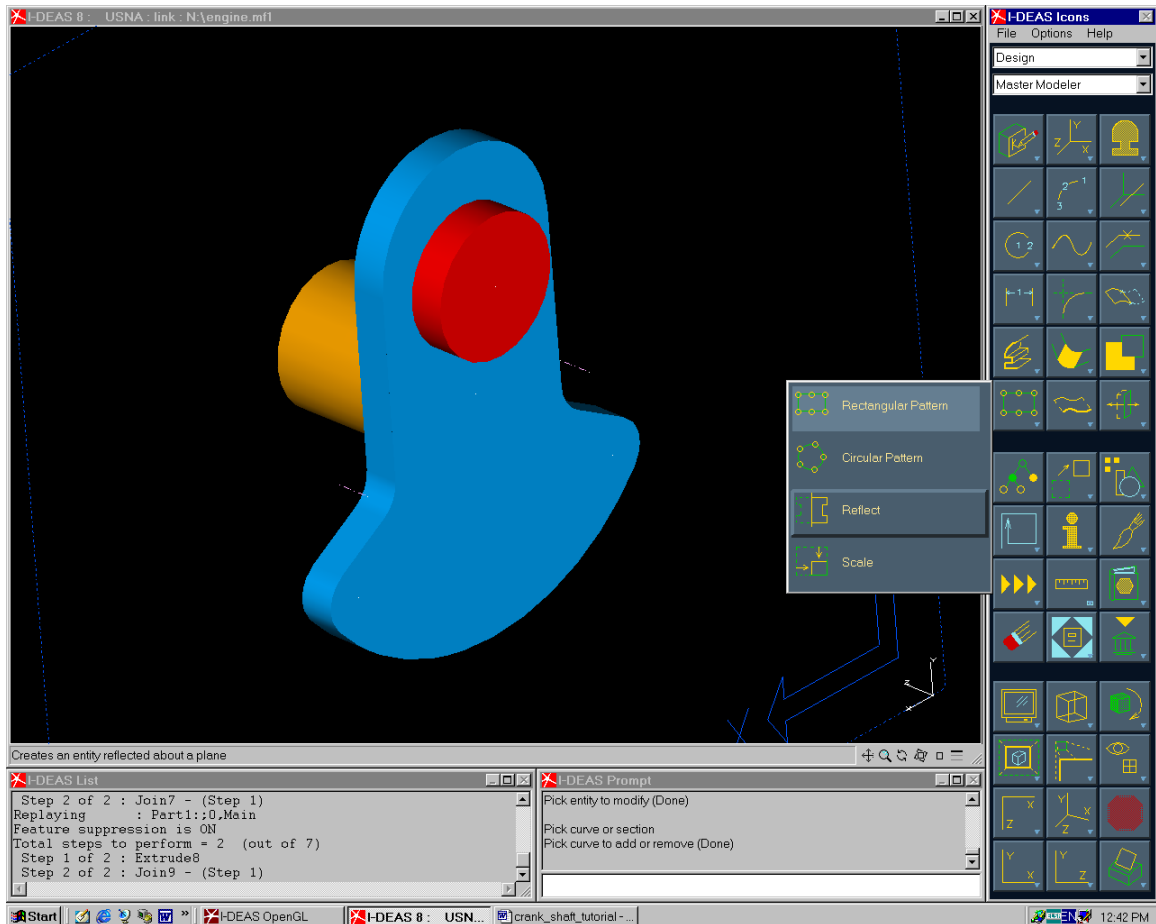
14. Draw a circle centered at the centerline for the smaller circle used in constructing the offset plate. Add the diameter dimension and modify this dimension to be 1.0 in.



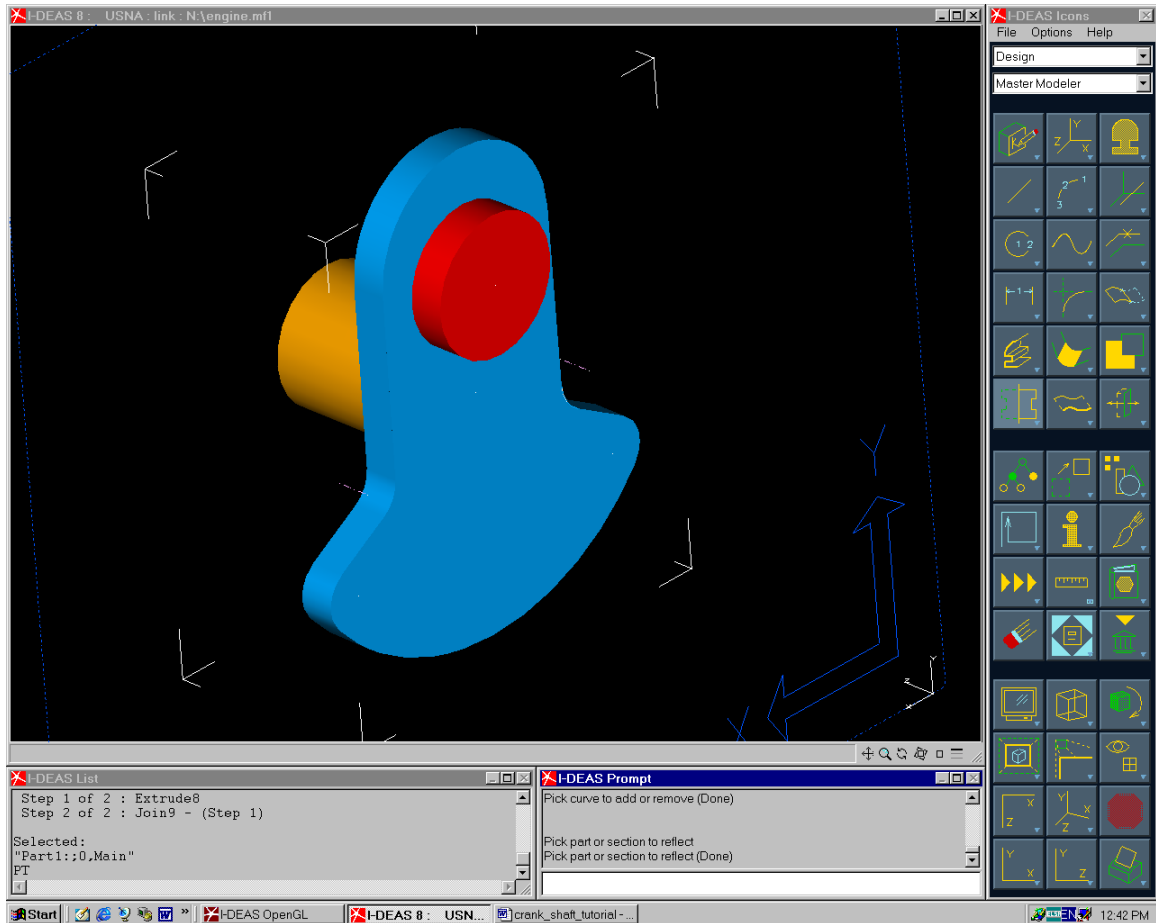
15. **Extrude** this circle a distance of 0.25 in.



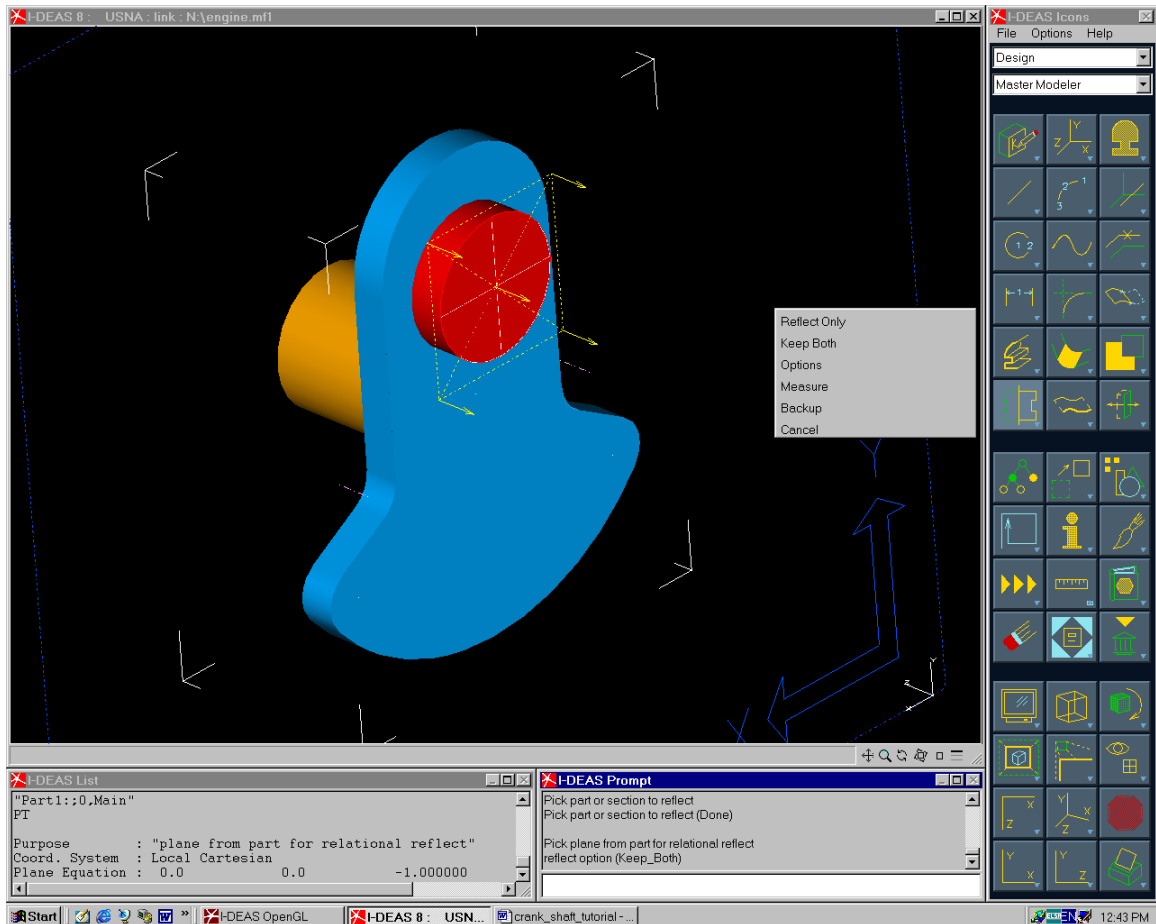
16. We now have half of the crankshaft. Rather than build a other offset plate and main journal, we will create a mirror image by reflecting this part. Pick the **Reflect** icon located under the **Rectangular Pattern** stack.



17. Select the part on the workbench as the part to reflect, then use **MMB** to indicate you are done picking entities to reflect.



18. The Prompt window will ask you to, "Pick plane from part for relational reflect." Select the planar surface at the end of the connecting rod journal. Then pick the option to **Keep Both**.



19. You should now have a crankshaft like the one shown. Name the part, "Crankshaft" when you put it away in the bin. You're your work and exit I-DEAS.

20. The next step will be to build a bearing housing for the crankshaft and a piston wrist pin. Once we have these parts, we can build an assembly and model the crank-slider mechanism.

